



Theoretical Statistics and Mathematics Unit

Indian Statistical Institute

203 B.T. Road, Kolkata - 700108

Pre-Thesis Submission Seminar

Date: July 28, 2026

Time: 4:15 PM

VENUE:

L-2, 4th Floor, A.N. Kolmogorov Bhavan, ISI Kolkata

SPEAKER:

Bappa Ghosh

Stat-Math Unit, ISI Kolkata

TITLE:

Levi-Civita connection on certain noncommutative Kahler Manifolds

ABSTRACT:

In this thesis, we investigate the uniqueness and existence of noncommutative Levi-Civita connections on certain noncommutative spaces by relating them with the noncommutative Chern connections on the space of holomorphic and anti-holomorphic one forms. The first class of examples are the Heckenberger-Kolb calculi on irreducible quantized flag manifolds. We begin by classifying covariant metrics (in the sense of Beggs and Majid) on a class of quantum homogeneous spaces. In particular, our classification implies the existence of a unique (up to scalar) quantum symmetric covariant metric on the Heckenberger--Kolb calculi. Moreover, we prove the existence and uniqueness of Levi-Civita connection for any real covariant metric for the Heckenberger--Kolb calculi. This generalizes Matassa's result for the quantum projective spaces.

The second class examples concern unitary cocycle deformations of covariant $\ast$ -differential calculi. We prove that complex structures, holomorphic bimodules and Chern connections on the deformed calculus are twists of their untwisted counterparts. Moreover, for cocycle deformations of a class of classical Kahler manifolds, the Levi-Civita connection on the space of one-forms of the deformed calculus is shown to be a direct sum of the Chern connections on the twisted holomorphic and the anti-holomorphic bimodules. Our results are also applicable to unitary cocycle deformations of the Heckenberger-Kolb calculi.

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